

UNITED STATES PATENT AND TRADEMARK OFFICE CERTIFICATE OF CORRECTION

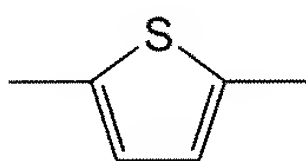
Page 1 of 26

PATENT NO. : 7,049,629
APPLICATION NO. : 10/646,389
ISSUE DATE : May 23, 2006
INVENTOR(S) : Yiliang Wu, Ping Liu; Lu Jiang; Beng S. Ong

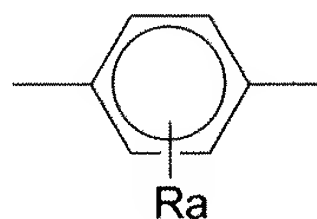
It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

The entire set of claims starting at Column 30, Line 29 and ending at Column 38, Line 43 should appear as follows:

1. An electronic device containing a thienylene-arylene polymer consisting of a repeating segment containing at least one 2,5-thienylene units of (I) and one arylene unit of (IIIa)



(I)



(IIIa)

wherein each R is independently an alkoxy side chain; and a represents the number of R groups and a is 2.

2. A device in accordance with **claim 1** wherein each R contains from about 1 to about 25 carbon atoms.

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Page 2 of 26

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It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

3. A device in accordance with **claim 1** wherein R is alkyl or alkoxy selected from the group consisting of pentyl, pentyloxy, hexyl, hexyloxy, heptyl, heptyloxy, octyl, octyloxy, nonyl, nonyloxy, decyl, decyloxy, undecyl, undecyloxy, dodecyl, dodecyloxy, tridecyl, tridecyloxy, tetradecyl, tetradecyloxy, pentadecyl, and pentadecyloxy.

4. A device in accordance with **claim 7** wherein dialkoxyphenylene is selected from the group consisting of bis(pentyloxy)phenylene, bis(hexyloxy)phenylene, bis(heptyloxy)phenylene, bis(nonyloxy)phenylene, bis(undecyloxy)phenylene, bis(dodecyloxy) phenylene, bis(tridecyloxy)phenylene, bis(tetradecyloxy)phenylene, and bis(pentadecyloxy)phenylene.

5. A thin film transistor comprised of a substrate, a gate electrode, a gate dielectric layer, a source electrode and a drain electrode, and a semiconductor layer comprised of the thienylene-arylene polymer of **claim 1**.

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Page 3 of 26

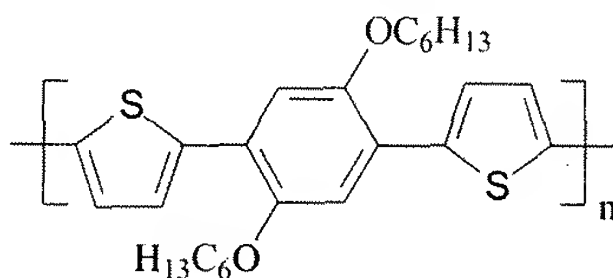
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It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

6. A thin film transistor in accordance with **claim 5** wherein R is alkoxy containing from about 5 to about 25 carbon atoms.

7. (Original) A thin film transistor in accordance with **claim 5** wherein said dialkoxyphenylene is selected from the group consisting of bis(pentyloxy)phenylene, bis(hexyloxy)phenylene, bis(heptyloxy)phenylene, bis(nonyloxy)phenylene, bis(undecyloxy)phenylene, bis(dodecyloxy)phenylene, bis(tridecyloxy)phenylene, bis(tetradecyloxy)phenylene, and bis(pentadecyloxy)phenylene.

8. A thin film transistor comprised of a substrate, a gate electrode, a gate dielectric layer, a source electrode, a drain electrode, and a semiconductor layer comprised of a polymer selected from a thienylene-arylene semiconductor polymer (1) through (5)



(1)

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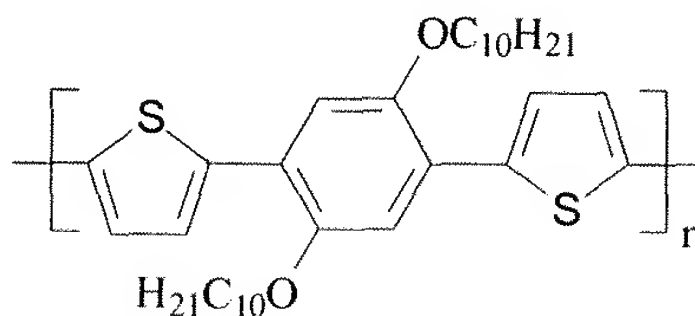
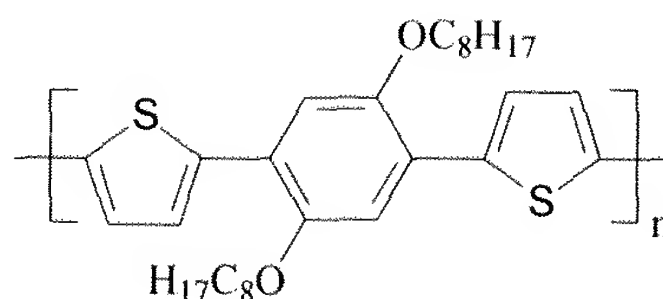
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Page 4 of 26

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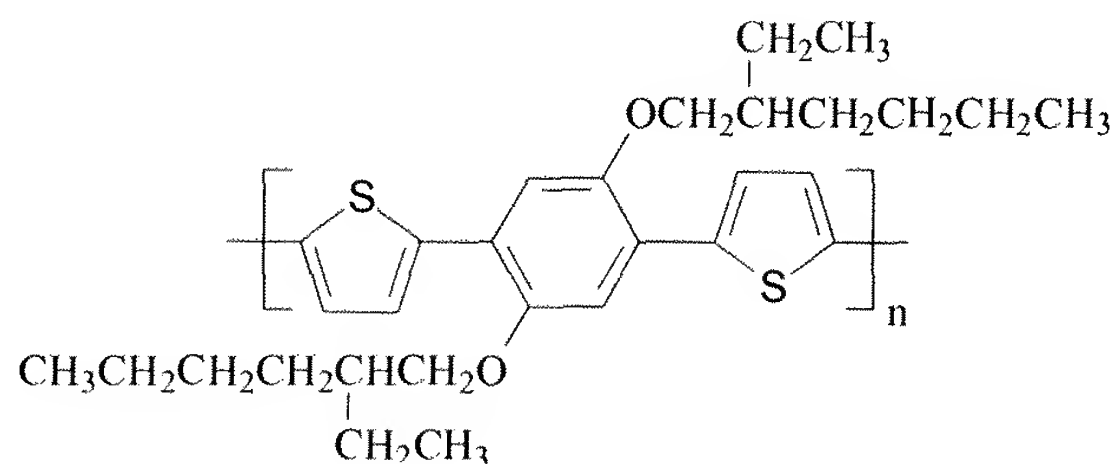
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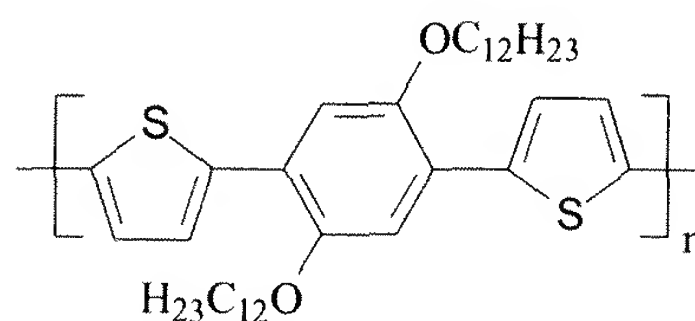
Page 5 of 26

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It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:



(4)



(5)

wherein n is from about 5 to about 500.

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Page 6 of 26

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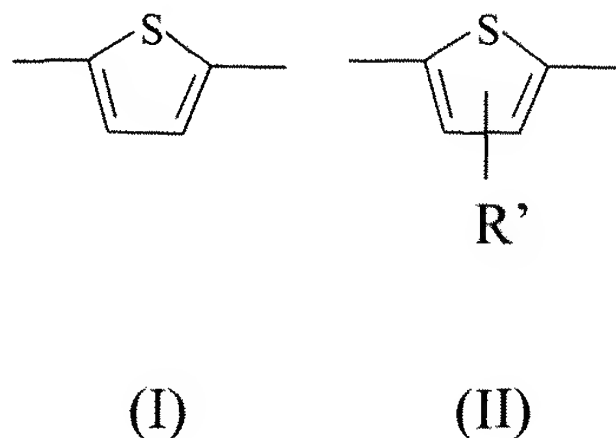
ISSUE DATE : May 23, 2006

INVENTOR(S) : Yiliang Wu, Ping Liu; Lu Jiang; Beng S. Ong

It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

9. An electronic device containing a thienylene-arylene polymer consisting of a repeating segment containing at least one 2,5-thienylene segment and at least one arylene segment, wherein the number of said arylene segments is from about 1 to about 3.

10. The electronic device of **claim 9** wherein the 2,5-thienylene segment comprises at least one 2,5-thienylene unit of (I) or (II)



wherein R' is halogen, alkyl, or alkoxy.

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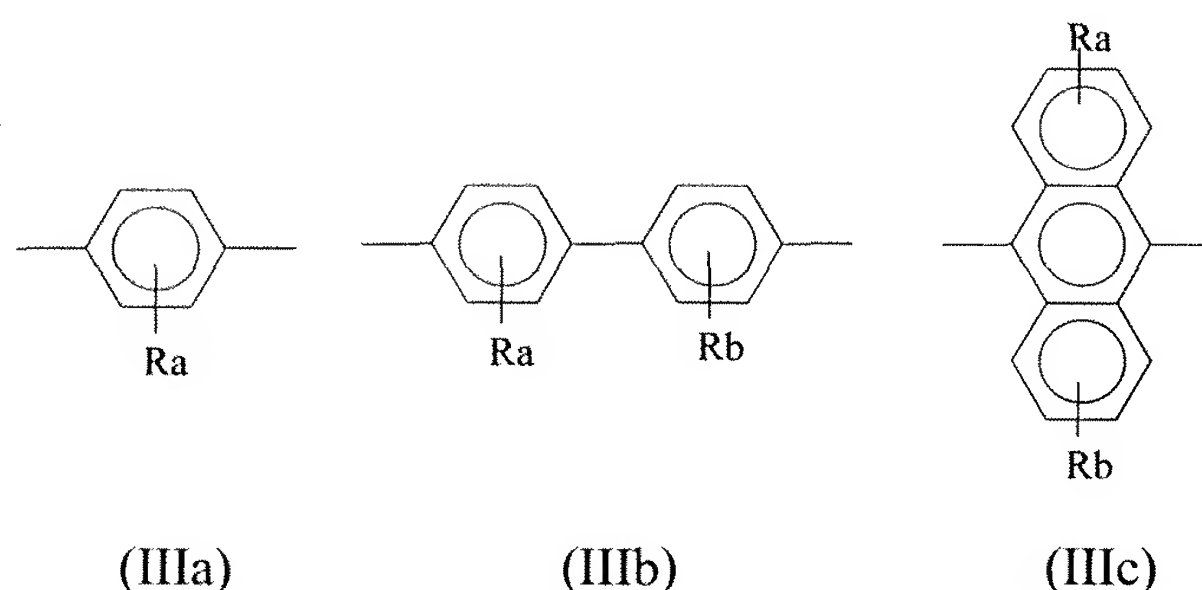
UNITED STATES PATENT AND TRADEMARK OFFICE CERTIFICATE OF CORRECTION

Page 7 of 26

PATENT NO. : 7,049,629
 APPLICATION NO. : 10/646,389
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 INVENTOR(S) : Yiliang Wu, Ping Liu; Lu Jiang; Beng S. Ong

It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

11. The electronic device of **claim 9** wherein the arylene segment comprises at least one arylene unit of (IIIa), (IIIb), or (IIIc)



wherein each R is independently an alkyl or an alkoxy side chain; and a and b represent the number of R groups, and wherein the number of said arylene units (IIIa), (IIIb), and (IIIc) is from about 1 to about 3.

12. A device in accordance with **claim 2** wherein a and b are 1 or 2.

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Page 8 of 26

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APPLICATION NO. : 10/646,389
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INVENTOR(S) : Yiliang Wu, Ping Liu; Lu Jiang; Beng S. Ong

It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

13. A device in accordance with **claim 1** wherein R' is alkyl or alkoxy selected from the group consisting of methyl, methoxy, ethyl, ethoxy, propyl, propoxy, butyl, butoxy, pentyl, pentyloxy, hexyl, hexyloxy, heptyl, heptyloxy, octyl, octyloxy, nonyl, nonyloxy, decyl, decyloxy, undecyl, undecyloxy, dodecyl, dodecyloxy, tridecyl, tridecyloxy, tetradecyl, tetradecyloxy, pentadecyl, and pentadecyloxy.

14. A device in accordance with **claim 1** wherein said arylene is a dialkylphenylene or dialkoxyphenylene.

15. A device in accordance with **claim 1** wherein arylene is dialkoxyphenylene.

16. A device in accordance with **claim 1** wherein said arylene is dialkylphenylene.

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Page 9 of 26

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INVENTOR(S) : Yiliang Wu, Ping Liu; Lu Jiang; Beng S. Ong

It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

17. A device in accordance with **claim 9** wherein said dialkylphenylene is selected from the group consisting of dipentylphenylene, dihexylphenylene, diheptylphenylene, dioctylphenylene, dinonylphenylene, didecylphenylene, bis(undecyl)phenylene, bis(dodecyl)phenylene, bis(tridecyl)phenylene, bis(tetradecyl)phenylene, and bis(pentadecyl) phenylene.

18. A thin film transistor in accordance with **claim 5** wherein R' is halogen of a chlorine or bromine atom.

19. A thin film transistor in accordance with **claim 5** wherein a and b are independently 1 or 2.

20. A thin film transistor in accordance with **claim 5** wherein arylene is a dialkylphenylene or a dialkoxyphenylene.

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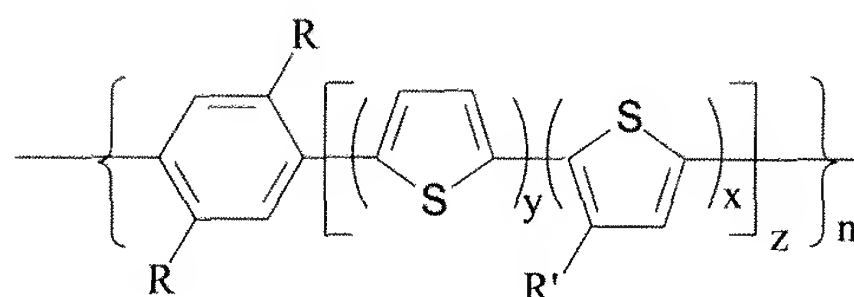
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Page 10 of 26

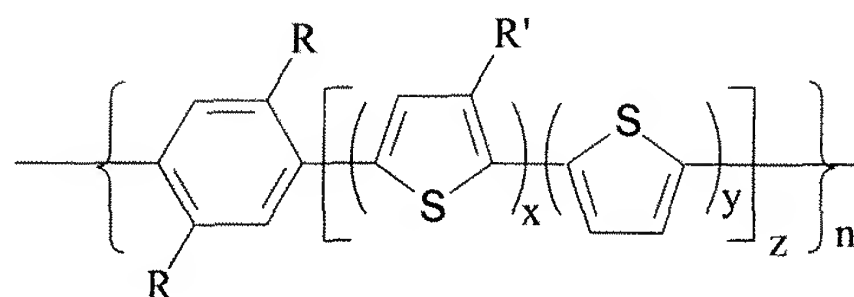
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It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

21. A thin film transistor comprised of a substrate, a gate electrode, a gate dielectric layer, a source electrode, a drain electrode, and a semiconductor layer comprised of a polymer represented by Formula (IV-a) or (IV-b)



(IV-a)



(IV-b)

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Page 11 of 26

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APPLICATION NO. : 10/646,389
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It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

wherein R is an alkyl or alkoxy of from about 5 to about 25 carbon atoms; R' is halogen, alkyl or alkoxy, each with about 1 to about 30 carbon atoms; x and y represent the number of segments and are optionally from 0 to about 10, provided that the sum of x and y is at least equal to 1; z is about 1 to about 5, and n is the degree of polymerization, or the number of repeating segments in said polymer, and wherein said n is optionally from about 5 to about 500.

22. A thin film transistor in accordance with **claim 21** wherein R is pentyl, hexyl, heptyl, octyl, nonyl, decyl, undecyl, dodecyl, tridecyl, tetradecyl, pentyldecyl, pentyloxy, hexyloxy, heptyloxy, octyloxy, nonyloxy, decyloxy, undecyloxy, dodecyloxy, tridecyloxy, tetradecyloxy, or pentadecyloxy.

23. A thin film transistor in accordance with **claim 21** wherein R' is methyl, ethyl, propyl, butyl, pentyl, hexyl, heptyl, octyl, nonyl, decyl, undecyl, dodecyl, tridecyl, tetradecyl, pentyldecyl, methoxy, ethoxy, propoxy, butoxy, pentyloxy, hexyloxy, heptyloxy, octyloxy, nonyloxy, decyloxy, undecyloxy, dodecyloxy, tridecyloxy, tetradecyloxy, or pentadecyloxy.

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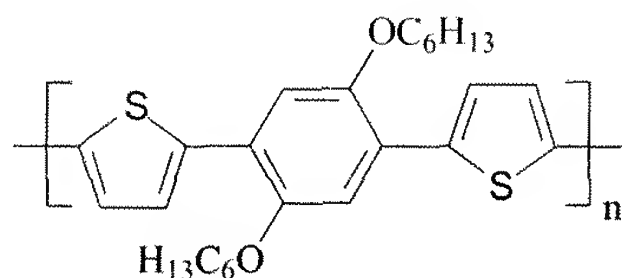
Page 12 of 26

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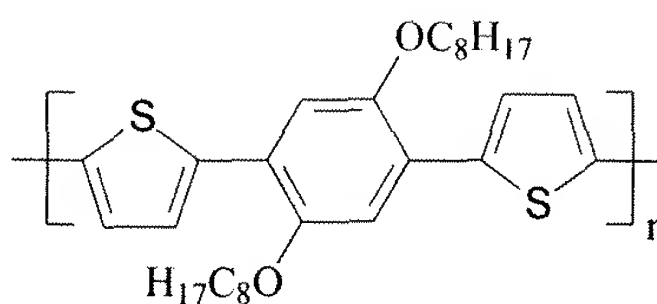
It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

24. A thin film transistor in accordance with **claim 21** wherein x, y and z are each independently from about 1 to about 5.

25. A thin film transistor in accordance with **claim 21** wherein said polymer is a thienylene-arylene semiconductor selected from (1) through (15)



(1)



(2)

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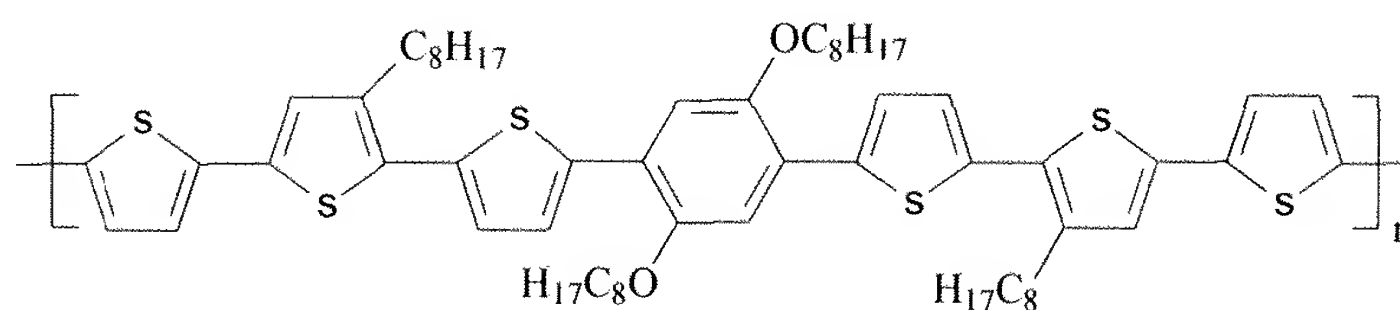
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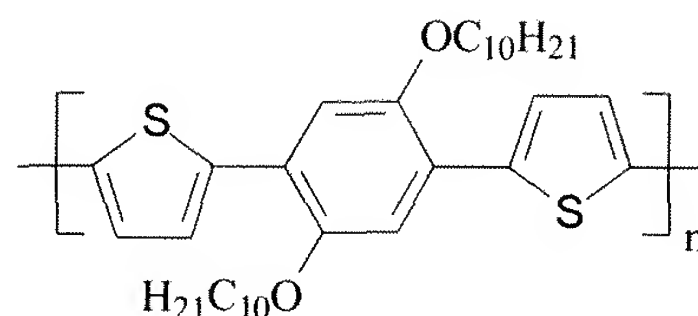
Page 13 of 26

PATENT NO. : 7,049,629
 APPLICATION NO. : 10/646,389
 ISSUE DATE : May 23, 2006
 INVENTOR(S) : Yiliang Wu, Ping Liu; Lu Jiang; Beng S. Ong

It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:



(3)



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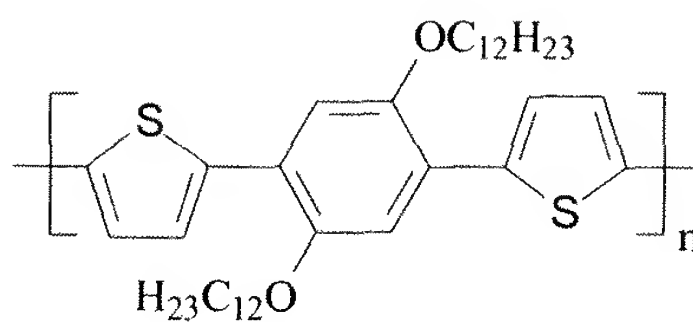
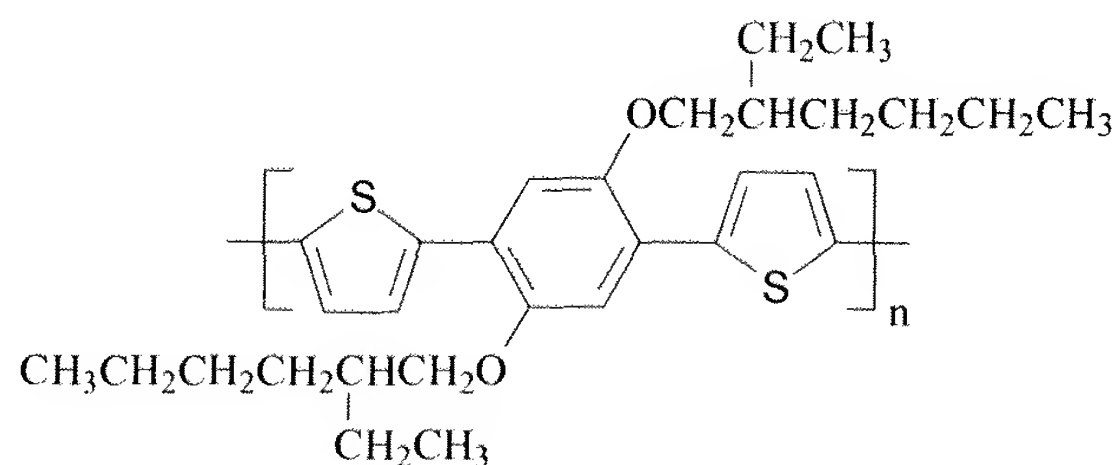
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UNITED STATES PATENT AND TRADEMARK OFFICE CERTIFICATE OF CORRECTION

Page 14 of 26

PATENT NO. : 7,049,629
 APPLICATION NO. : 10/646,389
 ISSUE DATE : May 23, 2006
 INVENTOR(S) : Yiliang Wu, Ping Liu; Lu Jiang; Beng S. Ong

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Page 15 of 26

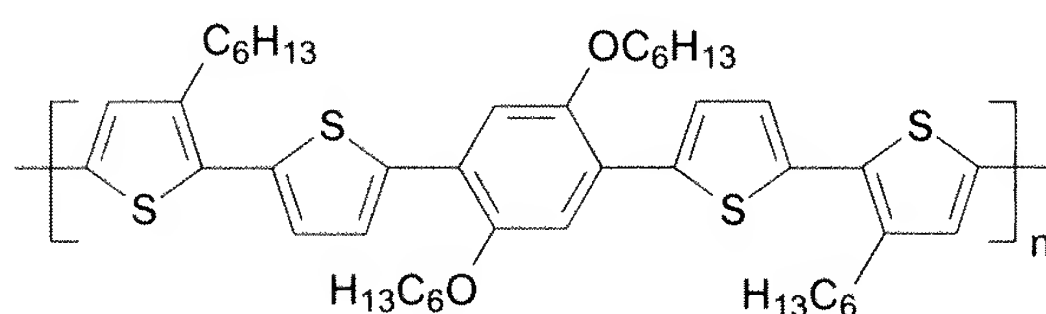
PATENT NO. : 7,049,629

APPLICATION NO. : 10/646,389

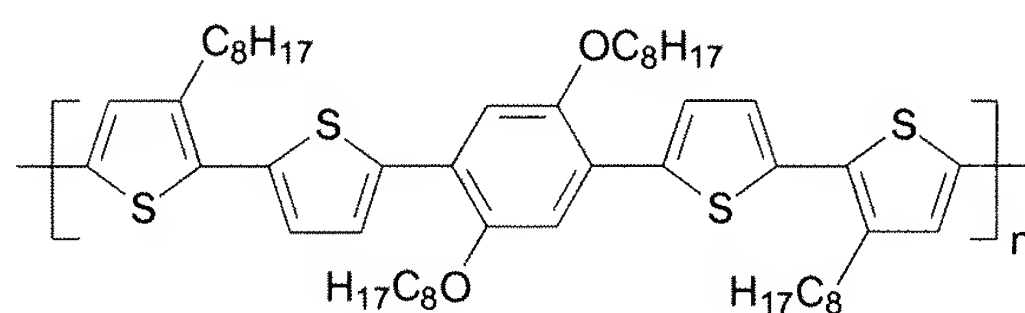
ISSUE DATE : May 23, 2006

INVENTOR(S) : Yiliang Wu, Ping Liu; Lu Jiang; Beng S. Ong

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Page 16 of 26

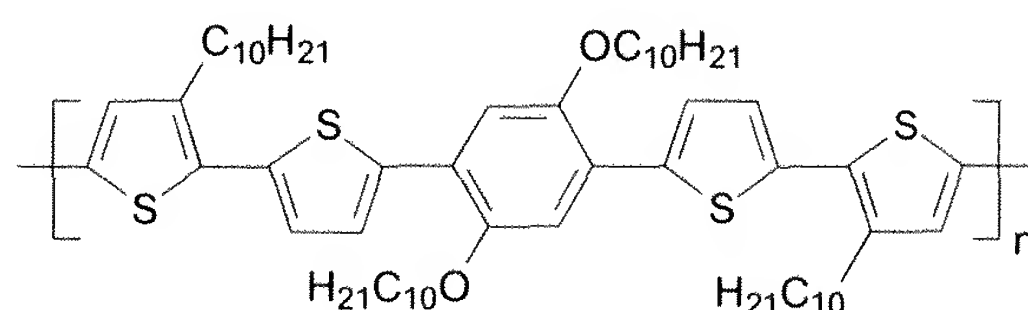
PATENT NO. : 7,049,629

APPLICATION NO. : 10/646,389

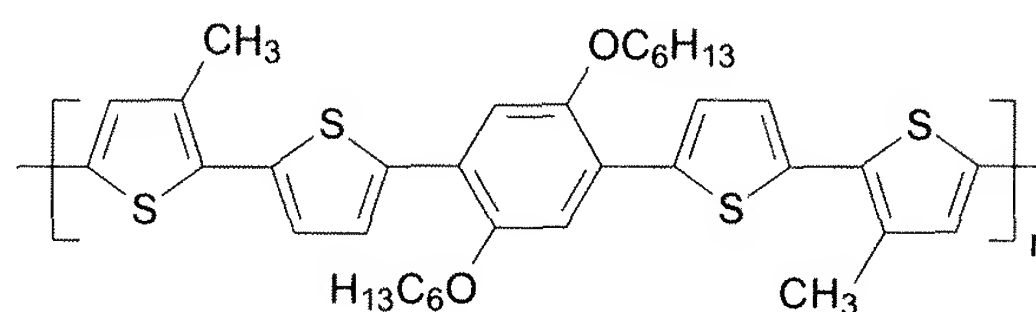
ISSUE DATE : May 23, 2006

INVENTOR(S) : Yiliang Wu, Ping Liu; Lu Jiang; Beng S. Ong

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Page 17 of 26

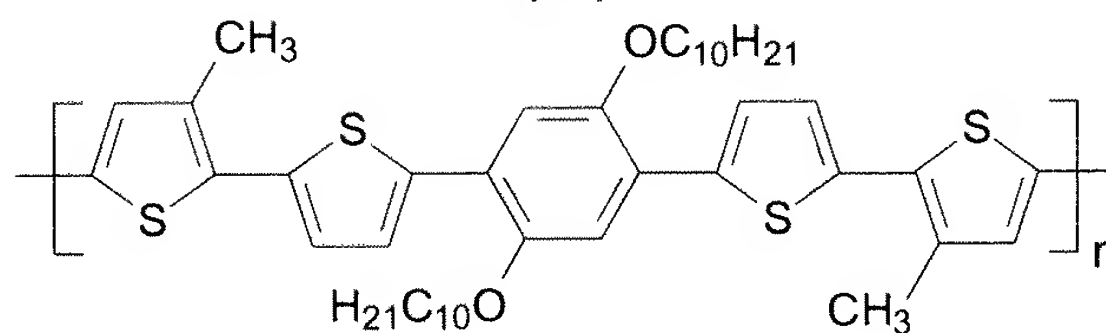
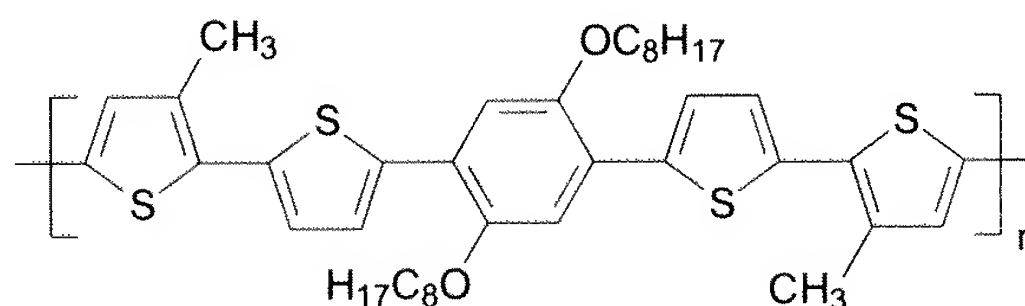
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INVENTOR(S) : Yiliang Wu, Ping Liu; Lu Jiang; Beng S. Ong

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Page 18 of 26

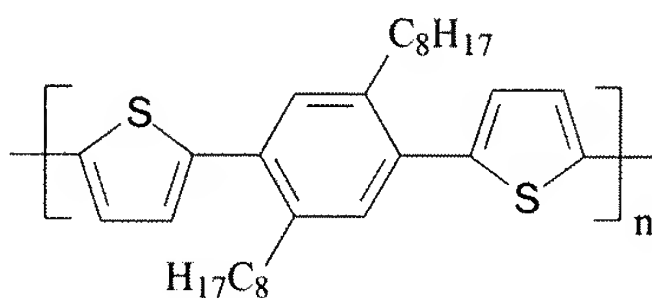
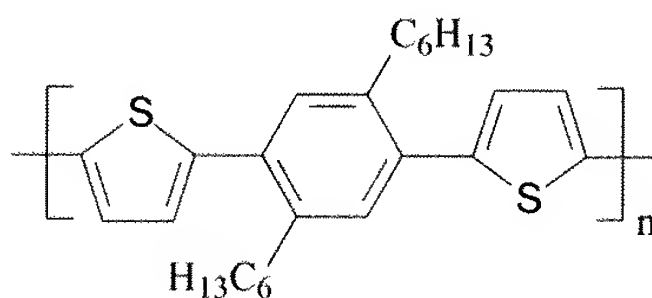
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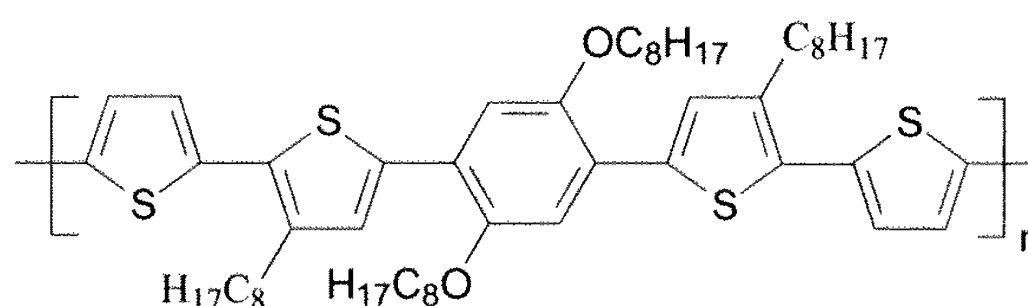
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Page 19 of 26

PATENT NO. : 7,049,629
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ISSUE DATE : May 23, 2006
INVENTOR(S) : Yiliang Wu, Ping Liu; Lu Jiang; Beng S. Ong

It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:



(15)

wherein n is from about 5 to about 200.

26. A thin film transistor in accordance with **claim 8** wherein said polymer is a thienylene-arylene semiconductor polymer selected from the group consisting of semiconductor polymer (2), (4), (6), (7), (8), (9), (10), (11), (12), (17), (18), and (19) wherein n is from about 25 to about 160.

27. A thin film transistor in accordance with **claim 21** wherein said substrate is a plastic sheet of a polyester, a polycarbonate, or a polyimide; said gate, source, and drain electrodes are each independently comprised of gold, nickel, aluminum, platinum, indium titanium oxide, a conductive

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Page 20 of 26

PATENT NO. : 7,049,629
APPLICATION NO. : 10/646,389
ISSUE DATE : May 23, 2006
INVENTOR(S) : Yiliang Wu, Ping Liu; Lu Jiang; Beng S. Ong

It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

polymer, a conductive ink or paste comprising a dispersion of conductive particles in a dispersing medium, and said gate dielectric layer is comprised of silicon nitride, silicon oxide, insulating polymers of a polyester, a polycarbonate, a polyacrylate, a poly(methacrylate), a poly(vinyl phenol), a polystyrene, a polyimide, an epoxy resin, an inorganic-organic composite material of nanosized metal oxide particles dispersed in a polymer, a polyimide, or an epoxy resin; and wherein said source/drain electrodes and said gate dielectric layer are in contact with said semiconductive layer.

28. A thin film transistor in accordance with **claim 21** wherein said substrate is glass or a plastic sheet; said gate, source and drain electrodes are each independently comprised of gold; said gate dielectric layer is comprised of an organic polymer of poly(methacrylate), polyacrylate, poly(vinyl phenol), polystyrene, polyimide, polycarbonate, or a polyester, and wherein said source/drain electrodes and said gate dielectric layer are in contact with said semiconductive layer.

29. A thin film transistor in accordance with **claim 21** wherein said polymer is a thienylene-arylene semiconductor layer formed by the solution process of spin coating, stamp printing,

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Page 21 of 26

PATENT NO. : 7,049,629
APPLICATION NO. : 10/646,389
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INVENTOR(S) : Yiliang Wu, Ping Liu; Lu Jiang; Beng S. Ong

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screen printing, or jet printing, and wherein said source/drain electrodes and said gate dielectric layer are in contact with said semiconductor layer.

30. A thin film transistor device in accordance with **claim 21** wherein said gate, source and drain electrodes, dielectric, and semiconductor layers are formed from components deposited by solution processes of spin coating, solution casting, stamp printing, screen printing, and jet printing, and wherein said source/drain electrodes and said gate dielectric layer are in contact with said polymer layer.

31. A thin film transistor device in accordance with **claim 21** wherein the substrate is a plastic sheet of a polyester or a polycarbonate, and the gate, source and drain electrodes are comprised of conductive polymers of polystyrene sulfonate-doped poly(3,4-ethylenedioxythiophene) or a conductive ink or paste of a colloidal dispersion of a metal of silver or gold in a binder, and the gate dielectric layer is an organic polymer or an inorganic oxide particle-polymer composite, and wherein said source/drain electrodes and said gate dielectric layer are in contact with said polymer layer.

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Page 22 of 26

PATENT NO. : 7,049,629

APPLICATION NO. : 10/646,389

ISSUE DATE : May 23, 2006

INVENTOR(S) : Yiliang Wu, Ping Liu; Lu Jiang; Beng S. Ong

It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

32. A thin film transistor device in accordance with **claim 21** wherein n is from about 50 to about 500, or from about 100 to about 350.

33. A thin film transistor in accordance with **claim 21** wherein the number average molecular weight (M_n) of (IV-a) or (IV-b) is from about 2,000 to about 100,000, and the weight average molecular weight (M_w) thereof is from about 4,000 to about 300,000, each as measured by gel permeation chromatography using polystyrene standards.

34. A thin film transistor in accordance with **claim 21** wherein the number average molecular weight (M_n) of (IV-a) or (IV-b) is from about 10,000 to about 50,000 and the weight average molecular weight (M_w) thereof is from about 15,000 to about 100,000.

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PATENT NO. : 7,049,629
APPLICATION NO. : 10/646,389
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35. A thin film transistor in accordance with **claim 21** wherein the thickness of the substrate is from about 500 micrometers to about 2 millimeters; the thickness of the gate dielectric layer is from about 100 nanometers to about 500 nanometers; the thickness of the polymer semiconductor layer is from about 50 nanometers to about 100 nanometers; and the thickness of the gate, source and drain electrode layer are each from about 50 nanometers to about 1 micrometer.

36. A device in accordance with **claim 1** wherein said arylene is a dialkoxyphenylene of bis(octyloxy)phenylene, or bis(decyloxy)phenylene.

37. A device in accordance with **claim 16** wherein said dialkylphenylene, or didecylphenylene.

38. A device in accordance with **claim 15** wherein said dialkylphenylene is dioctylphenylene.

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PATENT NO. : 7,049,629

APPLICATION NO. : 10/646,389

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INVENTOR(S) : Yiliang Wu, Ping Liu; Lu Jiang; Beng S. Ong

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39. A device in accordance with **claim 20** wherein said dialkylphenylene is dioctylphenylene, didecylphenylene, bis(octyloxy)phenylene, or bis(decyloxy)phenylene.

40. A device in accordance with **claim 1** wherein at least one is from 1 to about 50.

41. A device in accordance with **claim 1** wherein at least one is from about 5 to about 100.

42. A device in accordance with **claim 1** wherein at least one is 1.

43. A device in accordance with **claim 1** wherein (IIIa) is selected.

44. A device in accordance with **claim 1** wherein (IIIb) is selected.

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PATENT NO. : 7,049,629

APPLICATION NO. : 10/646,389

ISSUE DATE : May 23, 2006

INVENTOR(S) : Yiliang Wu, Ping Liu; Lu Jiang; Beng S. Ong

It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

- 45. A device in accordance with **claim 1** wherein (IIIc) is selected.
- 46. A device in accordance with **claim 21** wherein (IV-a) is selected.
- 47. A device in accordance with **claim 21** wherein (IV-b) is selected.

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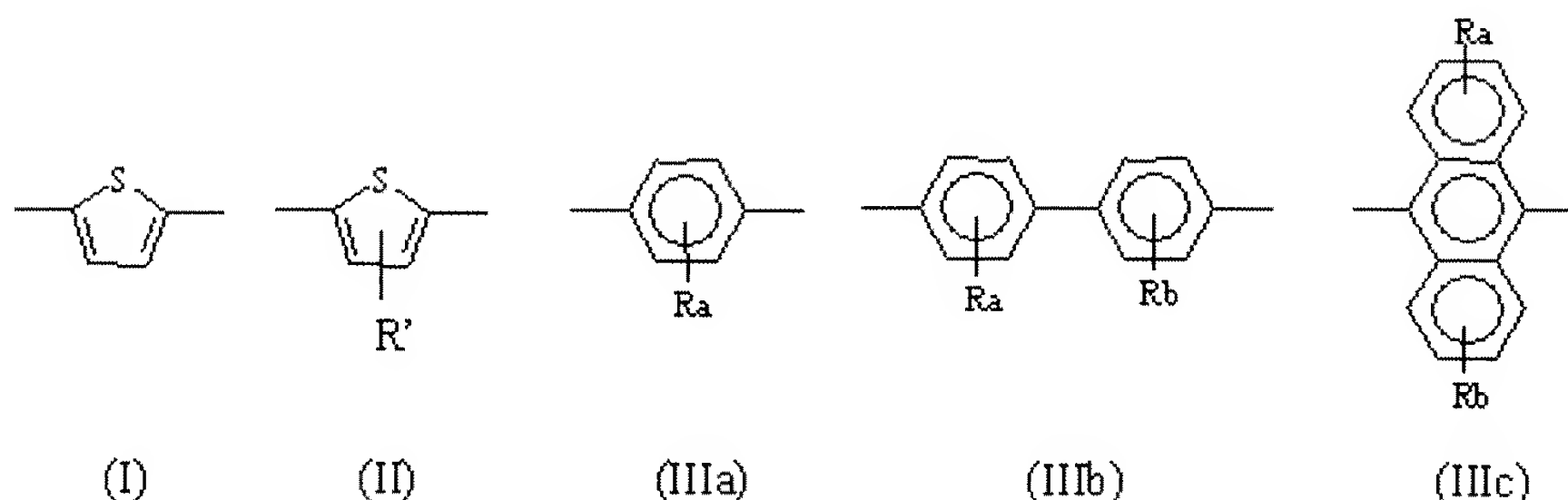
UNITED STATES PATENT AND TRADEMARK OFFICE CERTIFICATE OF CORRECTION

Page 26 of 26

PATENT NO. : 7,049,629
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 INVENTOR(S) : Yiliang Wu, Ping Liu; Lu Jiang; Beng S. Ong

It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

48. A thin film transistor comprised of a 2,5-thienylene repeating segment of (I) or (II), and at least one arylene segment of (IIIa), (IIIb), or (IIIc)



wherein each R is independently an alkyl or an alkoxy side chain; R' is halogen, alkyl, or alkoxy, and a and b represent the number of R segments or groups.

MAILING ADDRESS OF SENDER (Please do not use customer number below):

Richard M. Klein, Fay Sharpe LLP, 1228 Euclid Avenue, Fifth Floor, Cleveland, Ohio 44115-1843

This collection of information is required by 37 CFR 1.322, 1.323, and 1.324. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1.0 hour to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: **Attention Certificate of Corrections Branch, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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